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NUMBER EV 332039902 US

DATE OF DEPOSIT July 30, 2003
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MODULAR FLOOR PANELS WITH ENCLOSED WIREWAY CHANNELS

This application is related to an earlier filed Provisional Application Serial No: 60/470,573 filed May 14, 2003 entitled "Modular Floor Panels with Enclosed Wireway Channels" which is incorporated by reference herein.

BACKGROUND OF THE INVENTION

This invention relates generally to an improvement in modular floor panels and the systems made up therefrom, and deals more particularly with a modular floor panel that can be laid over a structural subfloor and will allow electrical and communications cabling to be accommodated and enclosed raceway channels defined therein.

The chief object of the present invention is to provide a structural hollow floor panel of minimal vertical height, and yet provide the necessary wireways or channels to accommodate the cabling associated with present day industrial and computer areas within a building structure.

The present disclosure relates to improvement in a system described in U.S. Patent No: 5,263,289. The disclosure in the '289 Patent is incorporated by reference herein.

The present invention also represents an improvement over a raised floor panel system currently sold by LEGRAND SNC, 87045 Limoges, France and will be found in the LEGRAND 2001/2002 catalog. That system is marketed by LEGRAND under the Trademark DL PASS. The LEGRAND DL PASS floor panel defines upwardly open and downwardly open raceway channels together with

interconnecting generally vertically oriented sets and subsets of ducts enabling communication passageways between the upper and lower raceways. The upper raceways run in one direction and the lower raceways run in a direction perpendicular to the one direction so that data/communication and power cables can be run in either a longitudinal or a lateral direction in the LEGRAND floor system. The injection molded floor panel rests directly on the subfloor so that the subfloor acts as a cover for the lower raceways. The upper raceway channels are enclosed by a floor panel which is structural, and which is of wood or composite material. Special panels are required to accommodate floor boxes, and the installer in the field must rework both the plastic injection molded panel and the cover panel in order to accommodate the junction box within the panel in the LEGRAND system.

In accordance with one aspect of the present invention the floor panel is molded from a synthetic plastic material to have a generally square or rectangular plan-form, with upwardly projecting longitudinally extending ribs defining at least two upwardly open channels. Downwardly projecting laterally extending ribs define at least two downwardly open channels oriented orthogonally to the upper channels. Access passageways are defined in part by gaps in the upwardly projecting ribs, which access passageways are further defined in part by adjacent sections of the downwardly open channels themselves. This allows cables to be passed between said upwardly and downwardly open channels. An upwardly open recess is provided between these two upwardly open channels, and between the two downwardly open channels so that an insert can be provided in this recess to provide a floor panel of geometry somewhat similar to that of the LEGRAND channel. However, unlike the LEGRAND system this insert can be removed in the field with a minimum of effort, to be replaced by a service or junction box capable of accommodating data and/or power outlet plugs and jacks.

In accordance with another aspect of the present invention the floor panel open recess provided between the two open channels is adapted to accommodate one or more activation brackets for power and data outlets, or to accommodate the centrally located outlet box.

The present invention further includes generally flat cover strips for enclosing the space defined by the downwardly open channels, without relying on a subfloor to accomplish this purpose. This is an important advantage as it avoids the need for providing the more expensive armor clad cabling otherwise required in prior art systems generally, and in the LEGRAND system in particular.

Finally, the present invention calls for a top panel of composite structural material such as is used in the LEGRAND floor panel system. Like the LEGRAND System the injection molded panel further includes peripherally arranged hollow post defining portions or pillars in order to provide the structural strength for the resulting floor so as to support relatively heavy equipment including computer systems and associated hardware. These posts or pillars of the present disclosure are similar to those utilized in the LEGRAND floor system, and are also shown in the prior art '289 Patent incorporated by reference herein.

For additional strength a removable center portion has a raised rib of a "T" shape provided centrally of the molded panel to cooperate with the pillars in supporting the floor panel. Removal is necessary only to incorporate a central electrical outlet box of the type known as a "poke-through" device.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 shows the panel from prior art Patent No: 5,632,289.

Fig. 2 shows a LEGRAND panel with the arrows depicting the paths taken by cabling in both the upper and lower raceway channels.

Fig. 3 shows an injection molded panel together with snap-in insert, and cover panels associated with the lower raceways in accordance with the present invention.

Fig. 4 shows a raceway panel of the present invention together with a fitting for feeding in data, communication, and power leads from the subfloor. Also shown are junction boxes fitted into the space normally filled wit an insert as shown in Fig. 3.

Fig. 5 illustrates a panel of the present invention fitted with down feeds of three different varieties together with several junction box configurations achieved as a result of the removal of the insert from the center portion of the panel.

Fig. 6 is a perspective view of a panel constructed in accordance with an alternative embodiment of the present invention.

Fig. 7 is a view of the panel in Fig. 6 but with portions of the "snap-off inner corner pieces" broken away.

Fig. 8 is a view similar to Fig. 7 but with an activation bracket for power and data devices that are adapted to be received in openings defined for them in the activation bracket.

Fig. 9 is a view similar to Fig. 8 but with the activation bracket provided in an adjacent side of the generally square open recess provided in the center of the panel.

Fig. 10 is a top view of the panel illustrated in Fig. 7, but showing the radiused integrally molded corner provided to protect fiberoptic cabling in a floor panel of the present invention.

Fig. 11 is a bottom view of the panel depicted in Fig. 10, and serves to better illustrate the lower panel portions provided in the bottom of the downwardly open channels.

Fig. 12 is a perspective view of a second alternative molded plastic panel.

DETAILED DESCRIPTION OF FIGS. 1-5 OF THE DRAWINGS

Turning now the drawings in greater detail, Fig. 1 shows the injection moldable synthetic plastic panel of U.S. Patent No: 5,632,289. This panel defines upwardly open raceway channels for power, telecomm and data cabling. Downwardly open raceway channels 61, 62 and 63 can accommodate cabling for running the cables in a direction perpendicular to the upwardly open channels 51, 52

and 53. Further, vertical ducts 71 and 72 are provided for routing cabling between these upwardly and downwardly open raceway channels.

As so constructed and arranged a cover panel can be provided on top of the Fig. 1 panel structure with the result that enclosed channels are provided for the cabling in the upper raceways. The subfloor (not shown) will enclose the downwardly open raceway channels. This prior art floor panel allows only relatively small openings 73 to accommodate floor box or junction boxes that will provide access to the cabling within the raceway for purposes of power plugs and data/telecommunication jacks.

The LEGRAND system of Fig. 2 also illustrates an injection molded floor panel with parallel raceways above and below the center line or center plane of the panel, which center plane is defined by the webs of these various channels as in the '289 Patent. Here again, the LEGRAND panel does not afford any convenient means for installing the relatively large floor box typical of present day raised floor installations. As mentioned previously the installer of such a floor system is required to cut away portions of the injection molded synthetic panel in order to accommodate such a floor box in this LEGRAND system.

Referring now to Fig. 3, a molded panel similar to those described above can be seen to include improvements that allow the following advantages to be realized. First, a relatively large floor box can be provided in the molded panel of Fig. 3 simply by removing the snap-in insert as suggested in this view. This provides a well with side edges designed to accommodate either relatively small individual outlet devices as suggested in Fig. 4 and in Fig. 5, or to instead accommodate a relatively massive floor box of generally square configuration such as for example a Walker fully adjustable Multi-Service Floor Box with Source III activation options.

The injection-molded panel of Fig. 3 further includes posts or pillars spaced peripherally around the rectangular panels. These pillars are similar to those utilized in the LEGRAND floor system, and in the prior art system disclosed in the '289 Patent in that they lend structural rigidity to the raised floor structure itself. The upwardly open channels are defined by integrally molded ribs, which ribs are

shown to have segments or sections removed. These sections are preferably molded in place, and removed in the field as a result of providing lines of weakening in areas at the ends of these segments to facilitate removal in the field by the installer.

Still with reference to Fig. 3, the ribs defines the upwardly open channels further define radiused nose portions integrally molded in the structure to relieve the bend radius of the cabling provided in the channels and run through the access passageways defined in part by the removable rib segments. These passageways are further defined by openings provided for this purpose in the web portion of the downwardly open raceway channels.

Still with reference to Fig. 3, the flat covers shown are either slid in place as suggested in the drawing, or provided with projecting rib portions integrally formed in the covers to be received in complimentary shaped portions of the downwardly projecting ribs of the panel.

Although not readily apparently from the single panel shown in Figs. 3, and 4 and 5, the present invention takes advantage of a feature disclosed both in the '289 Patent and in the LEGRAND system whereby the panels are adapted to be brought together in aligned relationship by reason of interlocking tabs provided on two adjacent sides of the square/rectangular panel, that cooperate with recesses defined for this purpose in the opposite two sides of each panel.

DETAILED DESCRIPTION OF FIGS. 6-11 OF THE DRAWINGS

Turning to Figs. 6-11 inclusively an injection molded synthetic plastic panel of the type described above with reference to the previous embodiment has somewhat different characteristics as will now be described.

Downwardly open raceway channels are provided to accommodate cabling in a direction perpendicular to the upwardly open channels as in the previous embodiment. Again, vertical ducts or passageways are also provided for routing the cable between these upwardly and downwardly open raceway channels.

As best shown in Figs. 10 and 11 the subfloor is not required to enclose the downwardly open raceway channels, and indeed the downwardly open raceway channels best shown in Figs. 10 and 11 are enclosed instead by panel portions that are either slid into place as shown in the drawing, or in the alternative, snapped into place by reason of the resiliency of the panels, and with the aid of nubs or projections provided for this purpose on the underside of the panel itself.

Still with reference to Fig. 10, a radiused corner is provided as shown to maintain a two-inch bend radius for fiberoptic cabling running in the upwardly open raceway channel and routed downwardly through an opening or duct into another channel defined by the lower side of the panel, for taking the cable in a direction perpendicular to that in the upwardly open channel.

An important feature of the improved panel of Figs. 6-11 can be attributed to the square configuration of the upwardly open recess. More particularly, one or more of four snap-off corner pieces, identified in Figs. 6 and 7 can be removed, so one is left with a relatively large opening as shown in Fig. 7. The through openings can be utilized to receive either an activation bracket running in the same direction as the upwardly open raceway channel, as shown in Fig. 8, or in the alternative this bracket can be provided in an adjacent but perpendicular side of the square recess for the same purpose, and as illustrated at Fig. 9.

In summary, and as an aid for the workman in connection with installing a system of the present invention, the first step would be for the installer to insure that the finished floor (usually concrete is clean and clear of debris).

Secondly, starting at one corner of the room, the installer lays the first injection molded panel, together with its cover assembly (not shown in Fig. 6-11) but described with reference to the previous embodiment. The base panel will preferably be fabricated for arrival at the job site with the composite wood top or cover panel attached.

The third step involves fastening the panel assembly to the floor, preferably with a mastic adhesive applied to the bottom of the plastic base. The pillar defining

portions of the injection-molded panel of Figs. 6-11 serve the same purpose as those described previously with reference to Figs. 3-5, namely to provide rigidity to the floor system.

The next step would be to line up tongue and grooves on the edge of another panel with those on the paneling already stuck to the floor, and to make sure that the second panel is square and level with the previous panel. It too is then fastened to the floor, preferably with a mastic adhesive.

The above installation of panels can be completed until a desired floor area is covered.

The next step is then to cut at least a certain number of the panels as required, with heavy-duty shears or snips, so as to provide the floor around obstructions and cover the area to be fitted with a floor of the present invention. One must assure that sufficient support is provided for these cut panels, and it is a feature of the present invention that the number of pillars or posts integrally molded into each base panel are numerous enough to serve this purpose. The channels in the base panel can be fitted with end caps so as to fully enclose the raceway channels in which the power and data cables will be strung. The cables are fed from a wall through a transition fitting, such as that described previously with reference to the earlier embodiment, and conventional conduit will be needed to feed the flooring system of the present invention. Thus, the transition fittings provide the necessary connections to existing conduit and include suitable knockouts in the end caps for this purpose.

Changes in the direction of the cable run can be conveniently carried out by removing an appropriate cover panel, removing the scored corner sections or wall sections as described previously, and the cabling pushed or fed in the desired directions. Separate radius control pieces maintain at least a 2-inch bend radius for fiberoptic cabling.

The cables in the raceways or channels can be secured with conventional wire or ties. The cables can be conveniently terminated in the floor boxes were appropriate and removal of any insert provided square areas within the base panel

as described previously may be required to receive a floor box either centrally of the upwardly open recess as described in the previous embodiment, or to receive an activation bracket as suggested in Figs 8 and 9.

In the event a door area so requires, a ramp assembly can be provided to assure a 12-inch run for each one-inch rise in the floor height due to the flooring system of the present invention.

Finally, carpet tiles or a similar floor treatment can be applied to the composite cover panels in accordance with the prior art '289 Patent and LEGRAND systems described with reference to Figs. 1 and 2 above.

DETAILED DESCRIPTION OF FIG. 12

Another alternative design for the synthetic plastic injection molded subpanel of Figs. 6-11 is shown in Fig. 12. It should be noted that the panel for Figs. 6-11, when subjected to the snapping out of the inner corner pieces as suggested in Fig. 7, leads to a panel with support only around the perimeter in the form of the spaced posts or pillars. These pillars are arranged in generally equally spaced relationship around the perimeter of the generally square panel as shown in Fig. 12, and as described above with reference to Figs. 6-11.

Still with reference to Fig. 7, the resulting openings provided after snapping off the inner corner pieces as suggested in Fig. 6 and 7 leads to a panel that is limited to these peripherally spaced posts for supporting the floor panel provided in conjunction with the plastic panel that is the major component of the present invention.

In order to provide a more structurally effective panel Fig. 12 shows a center "T" that is formed in the plastic panel, and it has a top edge at the center portion of the panel to come up to the same level as the top of the pillars or posts P,P.

Instead of the four openings in the center of the panel as shown in Fig. 7, the Fig. 12 embodiment provides for the same lateral side arrangement to receive two or

more activation brackets such as those described above with reference to Figs. 6-11. However, instead of an open hole behind such activation brackets the panel of Fig. 12 provides for a back to such activation brackets so the brackets can be fabricated without themselves including a back, lending greater efficiency to the injection molded production of the various components and parts of the present invention generally.

If required, the small square outlined center portion defining the "T", is itself removable in the same manner as described above with reference to the corner brackets of Figs. 6-11, and in the event that the use of a central floor "poke-through" device is to be installed.

In conclusion, the injection molded subpanel of Fig. 12 is intended to replace the panel of Fig. 6-11, but has many of the advantages outlined above for that panel of Fig. 6-11. In addition, the Fig. 12 panel provides additional support for the top floor panel placed on the subpanel during assembly of the floor all as described above with reference to the preceeding embodiments. While the raised rib or "T" serves the function of added support for the floor panel above it, another advantage to this configuration resides in the fact that when the molded plastic panel is made in an injection molded machine this configuration at the center greatly facilitates the injection molding process itself. During the injection molding process the flow of plastic in the mold can be greatly facilitated by reason of "risers" such as that defined by the raised rib in the center of the panel, designated a "T" herein.

In light of the above, it is therefore to be understood that within the scope of the appended claims, the invention may be practiced otherwise than as specifically described above.